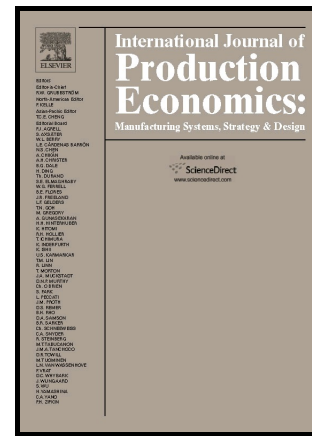


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## Quantitative Insights into the Integrated Supply Vehicle Routing and Production Planning Problem

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# Quantitative Insights into the Integrated Supply Vehicle Routing and Production Planning Problem

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## Abstract

In this work we assess the benefits of an integrated planning approach for the supply of raw material and the subsequent production process. The supply part is concerned with the collection of raw materials from geographically dispersed suppliers, while the production planning part addresses the conversion of those raw materials into final products to satisfy customer demand. The proposed model is an extension of the model introduced by Kuhn and Liske (2011) considering dynamic demand and general structures of the bill of materials. We investigate two scenarios: one including raw material inventories at the production site, and the other supposing just-in-time (JIT) supply. Numerical experiments show that substantial cost savings are possible with an integrated planning approach compared to a classical sequential approach. The JIT scenario and situations with a rather low utilization in the production system benefit most from the integration. The proposed supply vehicle routing and production planning problem has a kind of reverse structure compared to the well-studied production-distribution systems. Surprisingly, a sensitivity analysis on the dependency of the cost savings on different parameters show a quite similar behavior for both types of planning problems.

Keywords: integrated planning; supply-production planning; vehicle routing; just-in-time; mixed-integer programming

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